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AN EXPERIMENTAL ANALYSIS ON WOOD AND POLYMER COMPOSITE

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ABSTRACT

The prime goal of this work is to use the two waste material plastic and sawdust and make a composite which will have application like furniture material and as auxiliary material where quality isn't basic. In momentum situation of waste administration is huge issue for society and specialist are constantly working in this field. As of late numerous scientists have taken a shot at Wood Polymer Composite due to its fantastic mechanical property joined with light weight. In this work squander material is utilized as framework and sawdust as strengthen material. In essential stage composite made by fluctuating sawdust by 10, 20, and 30 percent by weight and furthermore the molecule measure is being differed from 0.2 - 0.4 mm utilizing network estimate 0.2 and 0.4 mm on vibrating strainer machine. Amid test planning difficulties confronted was porosity and non uniform conveyance was watched. To evacuate porosity in the wake of blending sawdust in liquid plastic is compacted in the cylinder chamber game plan. What's more, for uniform conveyance of sawdust in plastic distinctive mix time are utilized yet their further extent of enhancement The sawdust molecule measure has very little noteworthy job in expanding rate weight increase because of water ingestion however it mirrors that with increment in molecule estimate dispersion coefficient increments or water retention limit increments.

KEYWORDS: Sawdust, Wood & Polymer

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Original Article

I. INTRODUCTION

It has been seen that these days composite is commanding over customary designing materials. The fundamental reason is a result of it is built material and we can control properties of composite [1]. The visionary people into the field of condition, practicality, reusing and reusing fuse WPC in the once-over of present day materials which have enormous scope of employments. With time it is rapidly impacting its place in fulfilling the rising markets to ask. This class of material lies among wood and polymer with better in to lessen the demand of two that sooner or later be considered as mild [2].

Carbon sequestering and reusing plastic makes it doable. Preceding the happening to this material, most of the things whose need was low weight and tremendous quality were either involved wood or plastic. Plastics have constrained capacity to center life and using wood is taken as the utilization of trademark resources, so waste period by these two is colossal [3]. Other than the polymers are oil based thing and oil holds are at the skirt of its fulfillment. This certified truth is transforming into the veritable stress in spreading of care in WPC. By and by the request rises, How to make usage of these two for the practical improvement of mankind? By then the examination on wood fibers reinforced plastic was started and this investigation was trailed by ask about on strengthening glass, aluminum, carbon, boron and mineral strands in the plastic. Besides using the wood strands as a filler material is also incurred significant injury impacting as wood is regularly open in riches [4]. Low and high thickness polyethylene, polypropylene, polyethylene terephthalate, poly-vinyl chloride and polystyrene have the potential for

being utilized in the production of WPC and the assurance relies upon their condensing point. A wide variety of fibers that can be used for reinforced in the polymer arrange [5][6].

II. MATERIALS AND METHODS

Preparation of Raw Material

The visionary Sawdust was gotten from the carpentry workshop in Chandigarh University (Mohali), India. It was isolated in 0.1 - 0.2, 0.2 - 0.3 and 0.3 - 0.4 mm molecule estimate utilizing network measure 0.2, 0.3 and 0.4 mm on vibrating strainer machine at that point was plunged in tub of clean water for almost 15mins with the goal that the contaminations (sand particles) will settle down in the tub. The upper period of sawdust in tub was gathered with the end goal of composite advancement [7]. It was then dried in tourist oven at 110 ± 4ºC for 6-7 hours for lessening dampness substance to under 1%. For plastic Coca-Cola water bottle is utilized as it is a waste administration venture. Some physical property of plastic is that its thickness 0.93-0.97 g/cm3 and softening point 120-180 0C. Sawdust-Plastic composite were improvement through following sawdust and Plastic jug were weighted according to the compositional prerequisite as indicated by the Table 1. Right off the bat the platter with Plastic put in the programmable stifle heater set to 130 ± 2ºC as long as 20 minutes. At that point sawdust is blended now to blend with Plastic [8][9].

After embodiment uniform circulation of saw residue was finished with squeezing the dissolve in the semi-strong state in a cylinder barrel course of action. It was then put in stifle heater to loosen up the sawdust in the polymer framework. The soften was then put in the rectangular form and was hot pressurized to get the ideal shape as barrel ϕ350 X 125 mm for the testing reason[10,11].

Table 1: Formulation of Sawdust-PLASTIC Composite

Formulation	WPC Composition based on the % Weight		
	Saw Dust Size in (mm)	Plastic Content (%)	Saw Dust Content (%)
WPC-10-0.3	0.2	90	10
WPC-10-0.4	0.4	90	10
WPC-20-0.3	0.2	80	20
WPC-20-0.4	0.4	80	20
WPC-30-0.3	0.2	70	30
WPC-30-0.4	0.4	70	30

PHYSICAL TEST

Thermal Conductivity Test

The prepared samples for thermal conductivity test are diameter 350mm and thickness about 125mm. Lee's. disc method was used to measure the thermal conductivity (K)is defined at the heat current per unit area, which is perpendicular to the flow, and per unit temperature gradient by using the following equations [12]:

$$H=m\ c\ dT/dt$$

$$k=Hb/A(T1-T2)$$

Where;

H heat current in Watt (W),

m = is the mass of the lower disc in kilogram (kg),

c is the specific heat for the upper and lower discs in J/Kg-k,

A= the area of the specimen (π r^2) in meter square (m^2),

r is the radius of the specimen in meter (m), and

b is the specimen thickness (m).

Water Absorption Test

All samples prepared were measured before water absorption test on weighing balance machine. Then samples are immersed in distilled water for 7days. The relative mass gain and diffusion coefficient were calculated by [13]:

$$\Delta W\% = \frac{(\textbf{Weight of wet sample} - \textbf{Weight of dry sample}) \times 100}{\textbf{Weight of dry sample}}$$

$$D = \pi \quad (kb / 4M\infty)^2$$

Where:

D: diffusion coefficient,

B: is the initial thickness of the specimen.

M∞: saturation of water content.

k: the slop of the curve between mass gain and immersion time.

III. RESULTS AND DISCUSSIONS

Results of Thermal Conductivity

Table 2: Thermal Conductivity Results for Samples

Sample	Thermal Conductivity (k) in W/m.k
WPC-10-0.2	0.09
WPC-10-0.4	0.10
WPC-20-0.2	0.13
WPC-20-0.4	0.12
WPC-30-0.2	0.16
WPC-30-0.4	0.17

The above table demonstrates that base warm conductivity got of test with 10 percent sawdust blended with Plastic and size of sawdust extend from 0.2 - 0.4 mm. It demonstrates that warm conductivity isn't relying on the sawdust molecule size or it might be conceivable that method utilized isn't adequate to distinguish the impact of molecule measure. Furthermore with increment in sawdust rate increment in warm conductivity is watched.

Result of Water Absorption Test

Water absorption results after immersed in distilled water 7 days are shown in the table (3).

Table 3: Water Absorption Resultes for RPET Samples Immersed in Distilled Water 7 Days

Sample	Weight Gain %	Diffusion $m^2/sec \times 10^{-14}$
WPC-10-0.2	1.03	2.80
WPC-10-0.4	1.30	2.92
WPC-20-0.2	2.40	2.99
WPC-20-0.4	2.56	3.04
WPC-30-0.2	3.32	3.05
WPC-30-0.4	3.35	3.11

From the water absorption test held with distilled water it is concluded that maximum percentage weight gain was of sample WPC-30-0.4 and minimum was of WPC-10-0.2. It reflects that with increase in sawdust percentage and sawdust particle size Diffusion coefficient increases. Maximum diffusion obtained is 3.11 x 10^{-14} m^2/sec for sample with 30 percent sawdust with 0.3 – 0.4 mm particle size.

IV. CONCLUSIONS

It has been seen from the warm conductive test that while expanding sawdust rate its warm conductivity increments. With a similar test it demonstrates that warm conductivity isn't relying on the sawdust molecule measure.

From water assimilation test it is presumed that with increment in sawdust rate by weight it expands the retention limit likewise mirrors the expansion in dispersion coefficient improvement. The sawdust molecule measure has very little critical job in expanding rate weight increase because of water ingestion however it mirrors that with increment in molecule estimate dissemination coefficient increments or water retention limit increments.

From the water retention test held with refined water it is inferred that most extreme rate weight gain was of test WPC-30-0.4 and least was of WPC-10-0.2. It mirrors that with increment in sawdust rate and sawdust molecule measure Diffusion coefficient increments. Greatest dissemination got is 3.11 x 10-14 m2/sec for test with 30 percent sawdust with 0.3 - 0.4 mm molecule measure.

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